

Land & Ocean Coupling Associated with Tropical Cyclones

Introduction

Tropical cyclones are giant spiraling systems of clouds and thunderstorms that form over tropical and subtropical waters. Generally, tropical cyclones are known as cyclones, typhoons, and hurricanes; depending upon the geographical region. Tropical cyclones are known to desecrate coasts and threaten the people living in these areas. The optimal conditions for tropical cyclones to form are during pre-existing weather disturbances, abundant moisture, relative light winds, warm tropical oceans, and vertical temperature profiles. (NWS Climate predication Center, 2022).

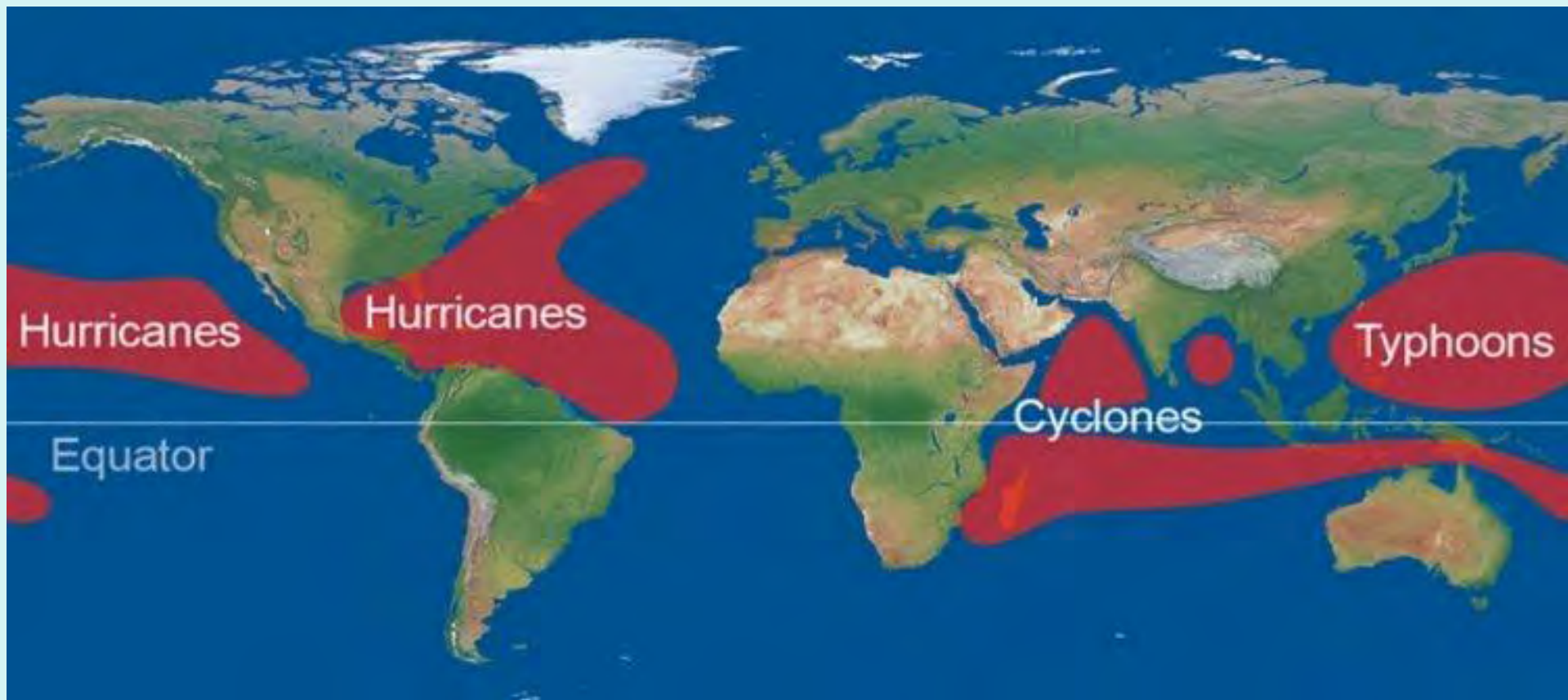


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Objective

The objective of this research is to study the long-term (2003-2022) variability of the ocean and land temperature and the vertical temperature contrast between the land and ocean associated with tropical cyclones. The variability shown by the time series air temperature between land and ocean at 100 hPa and 900 hPa demonstrates long-term changes related to the progression of climate change.

Methods

Data Used

Atmospheric temperature data derived from multi satellites through the NASA Giovanni portal were used from 2003-2022. The changes in the long-term temperature vertical profile and contrast between ocean and land temperature were analyzed.

Locations

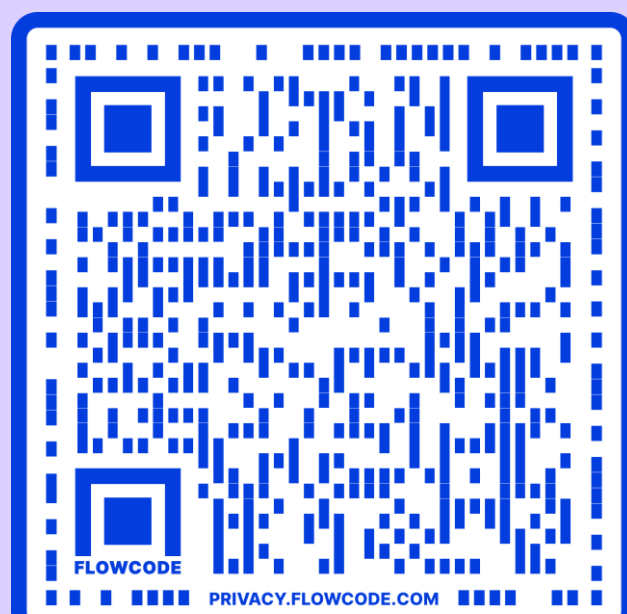
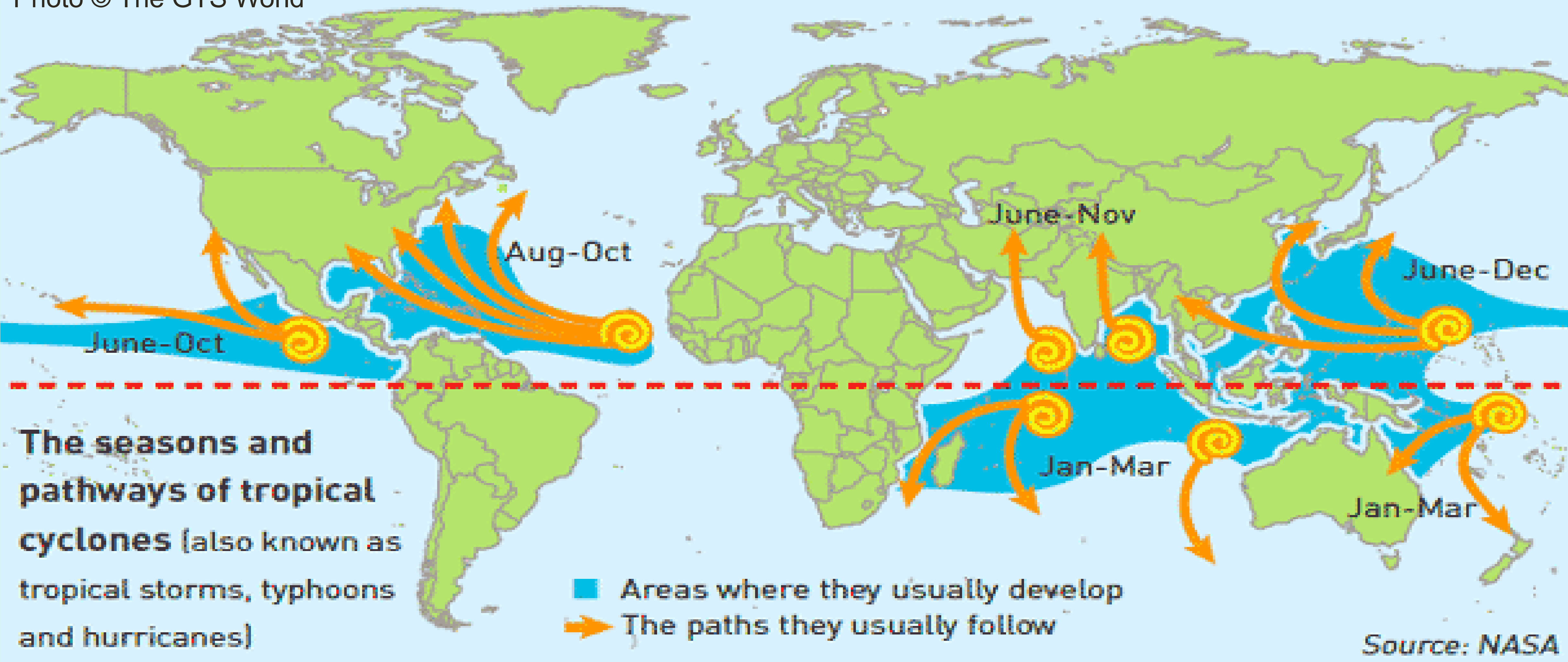
- Westcoast of Africa
- India
- United States



*Long time series of land and ocean temperatures provide **climate change** information. Tropical cyclones **influence** vertical profiles and contrast in ocean-land temperature, which can **predict** the **intensity** and **precipitation** of tropical cyclones.*



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Author **Karen Valencia Rojas**

Mentor **Dr. Ramesh Singh**

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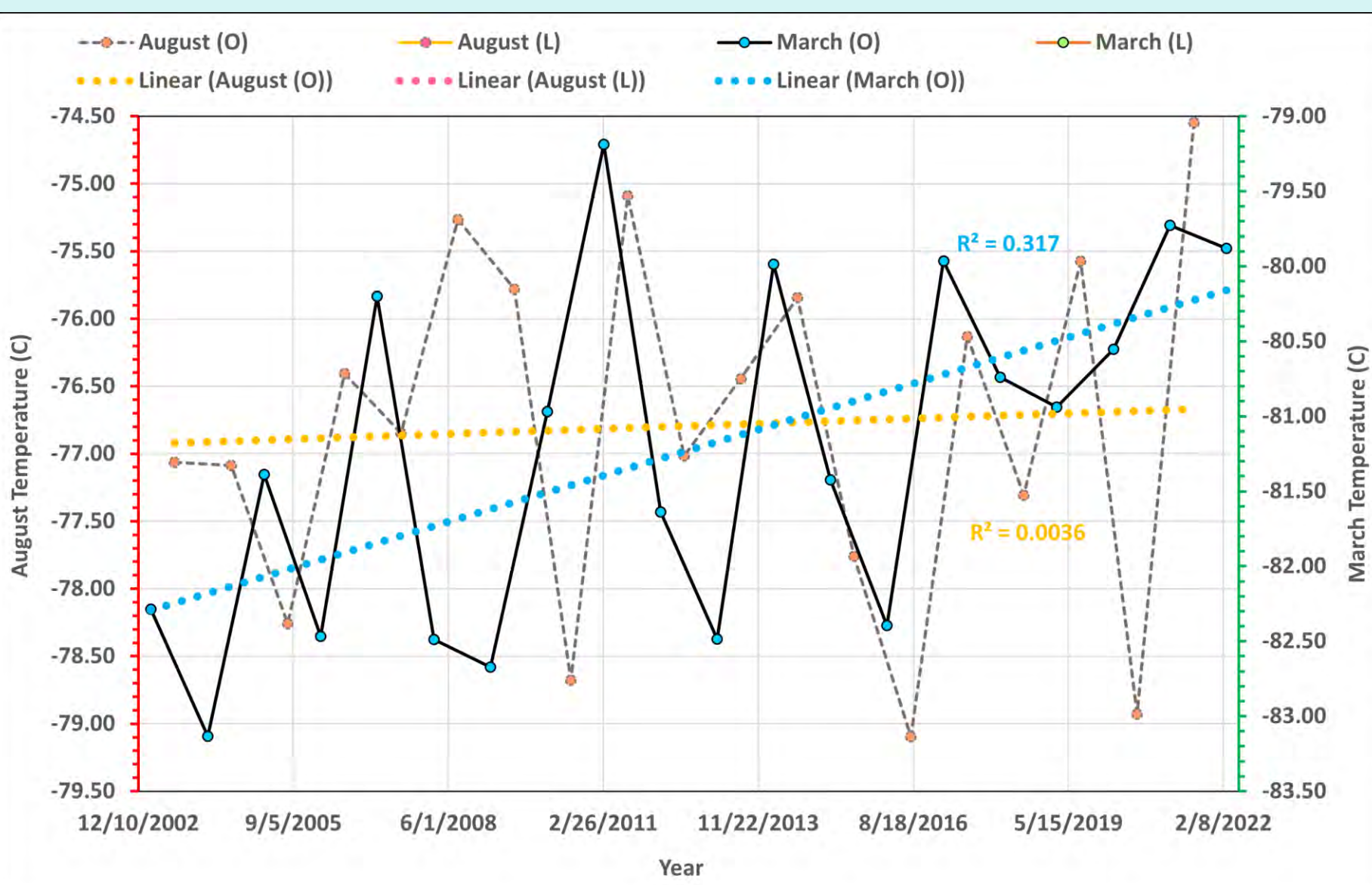
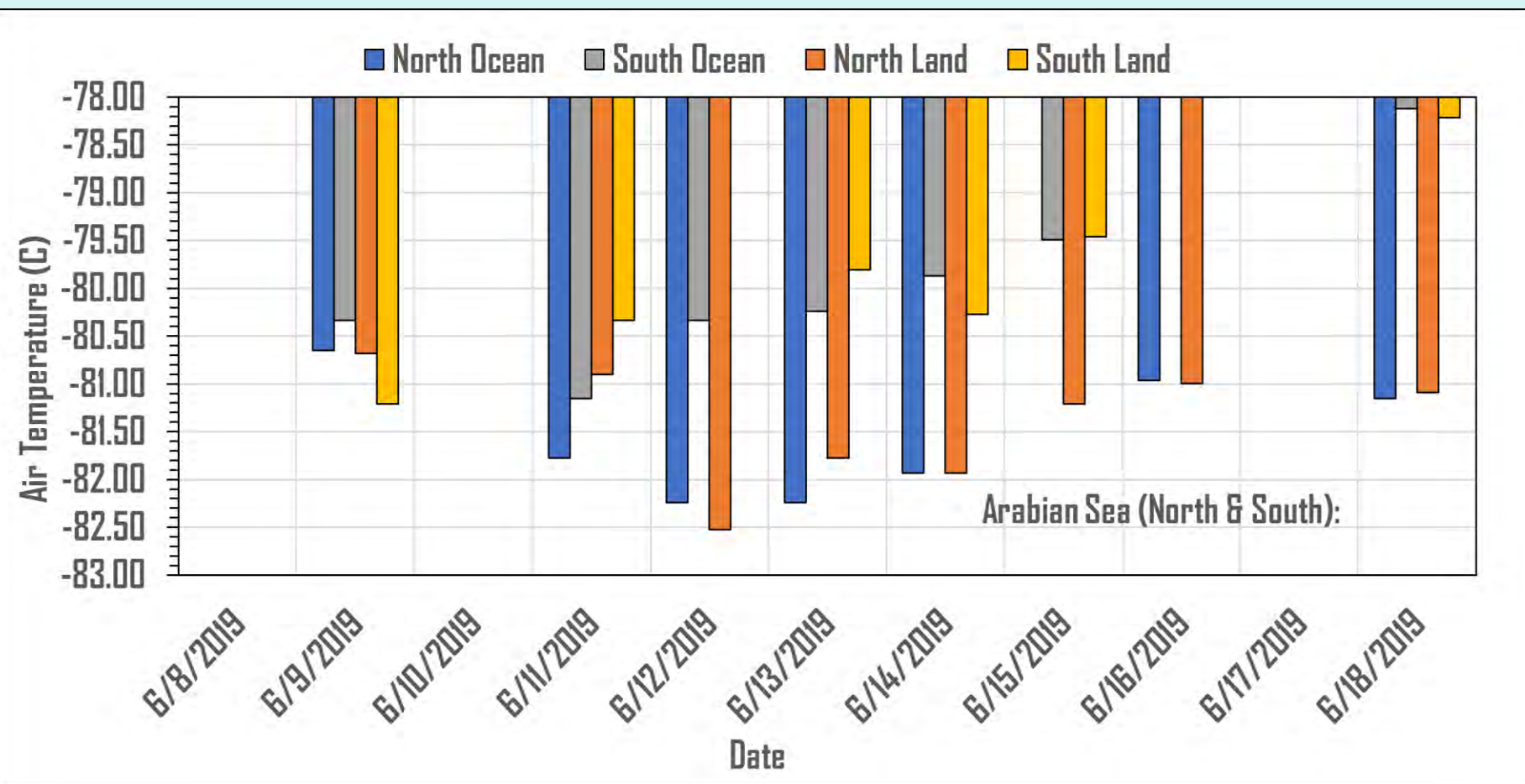
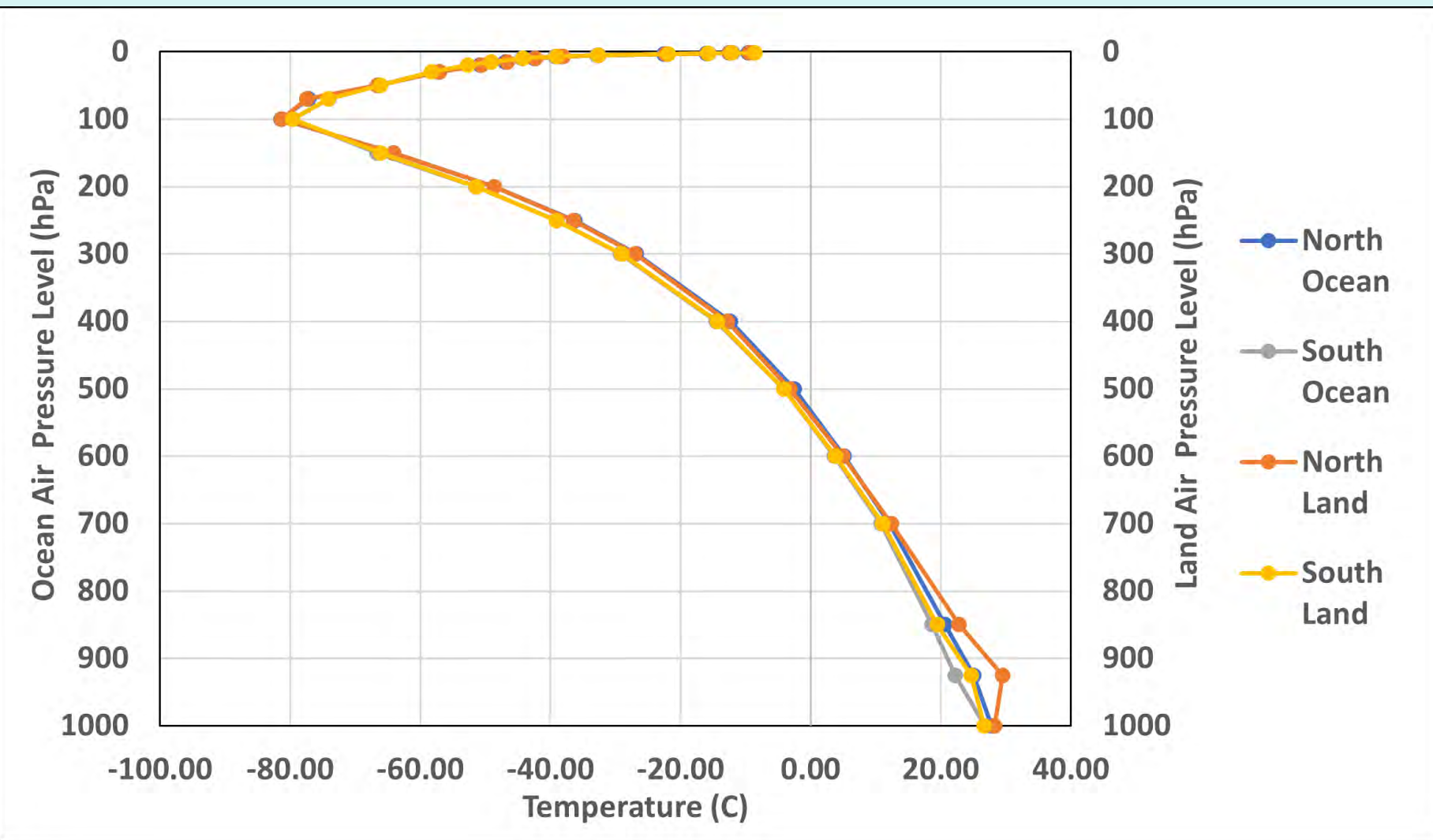
Results

- Global Precipitation Measurement (GPM) data show high precipitation associated with tropical cyclones.
- A significant change in the vertical profile of air temperature over ocean and land. Also shows the contrast in temperatures between ocean and land at 100 hPa.
- The air temperature time series shows high contrast between ocean-land.

Discussion

Global warming is not uniform across the world, during the climate change scenarios (Chowdhury Manna, Ghosh, Mondal, 2022). Sea surface and surface temperature are key indicators of global warming, which influence cyclonic disturbances. There are significant regional variations in temperature changes, making regional studies more important (Rohini, Rajeevan, Soni, 2022). Therefore, analyzing the relationship between land and ocean coupling can help to forecast the intensity and associated precipitation of tropical cyclones.

Changes in Vertical Profiles



Karen Valencia Rojas

Chapman

'Land & Ocean Coupling Associated with Tropical Cyclones'

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Figure 1: Photo© Team Write.

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Methods: *Data Used-* Atmospheric temperature data derived from multi satellites through the NASA Giovanni portal were used from 2003-2022. The changes in the long-term temperature vertical profile and contrast between ocean and land temperature were analyzed.

Locations- Westcoast of Africa, India, United States.

Figure 2: Visual maps of Westcoast of Africa, India, and the United States.

Long time series of land and ocean temperatures provide climate change information. Tropical cyclones influence vertical profiles and contrast in ocean land temperature, which can predict the intensity and precipitation of tropical cyclones.

Figure 3: Visual map of seasons and pathways of tropical cyclones.

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Changes in Vertical Profiles:

Figures 4-6: Visual graphs and charts that are relevant to the research.